



2018

# NORTH AMERICA PERFORATING SYMPOSIUM

GALVESTON, USA

## P&A OPERATIONS AND THE EMERGING US DOMESTIC MARKET

NAPS-29-18

AUTHORS: Justin Coker Owen Oil Tools, Grant Rollins Expro Americas LLC.,  
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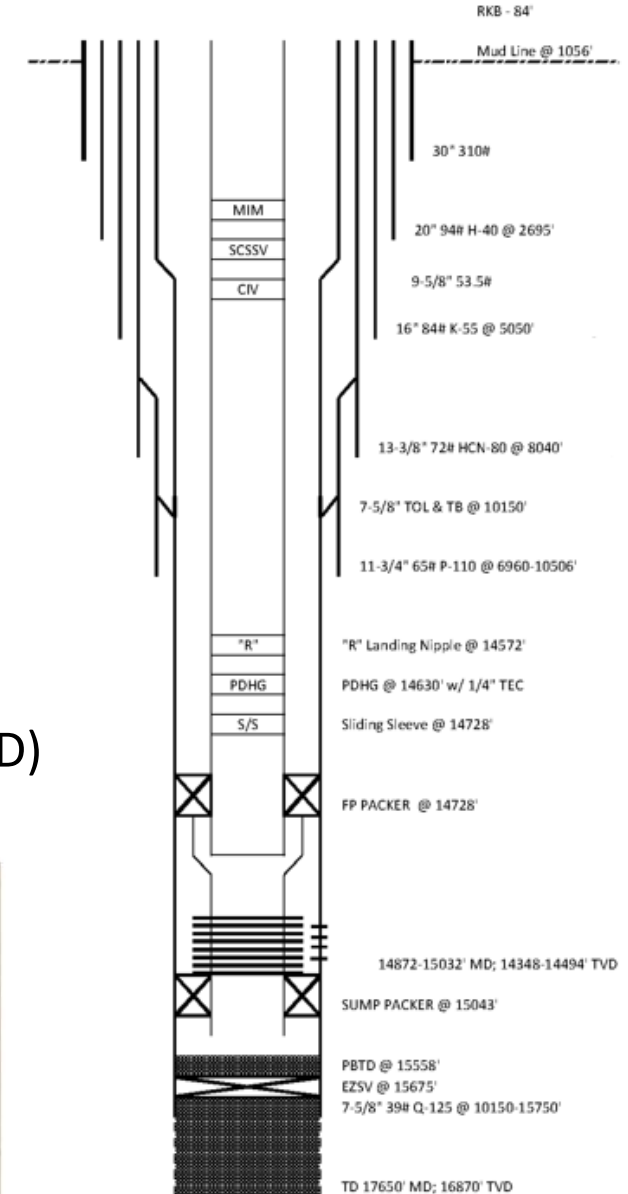
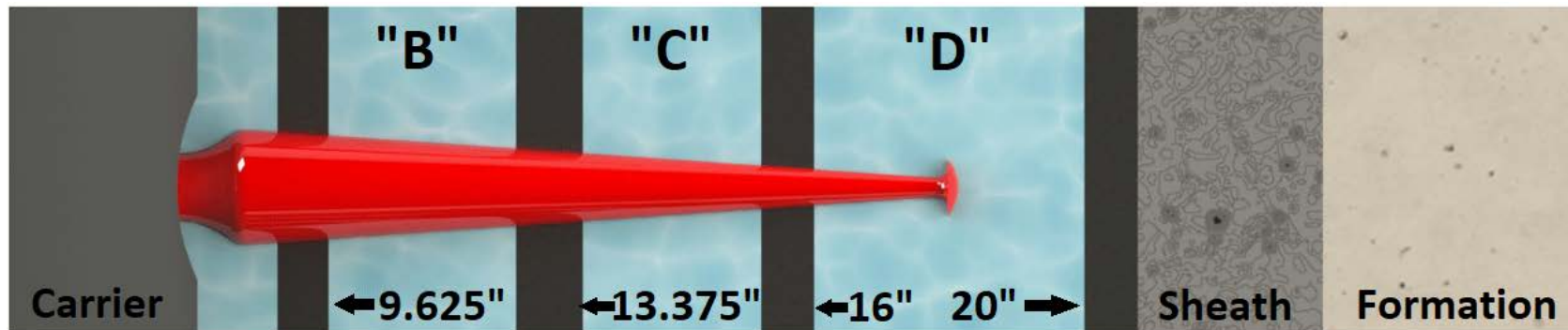


## What is P&A and what is required?

- Decommissioning of a well at end of productivity
  - Mechanical plug
  - Cement, resin, or other media plug
- For an annular space that communicates with open hole and extends to the mud line
  - A cement plug at least 200 feet long set in the annular space
  - Plug must be cross sectional
  - Plug must extend at least 200 feet above the liner top
- Pressure test each casing annulus to verify isolation.

## Two Subsea Wells To P&A

- ISOLATION REQUIRED IN MULTIPLE ANNULI:
  - Perforate 9.625" stop short of 13.375" where possible (B)
  - Perforate 9.625" and 13.375" stop short of 16" at ~3000' (C)
  - Perforate 9.625" and 13.375" and 16" stop short of 20" at ~2050' (D)

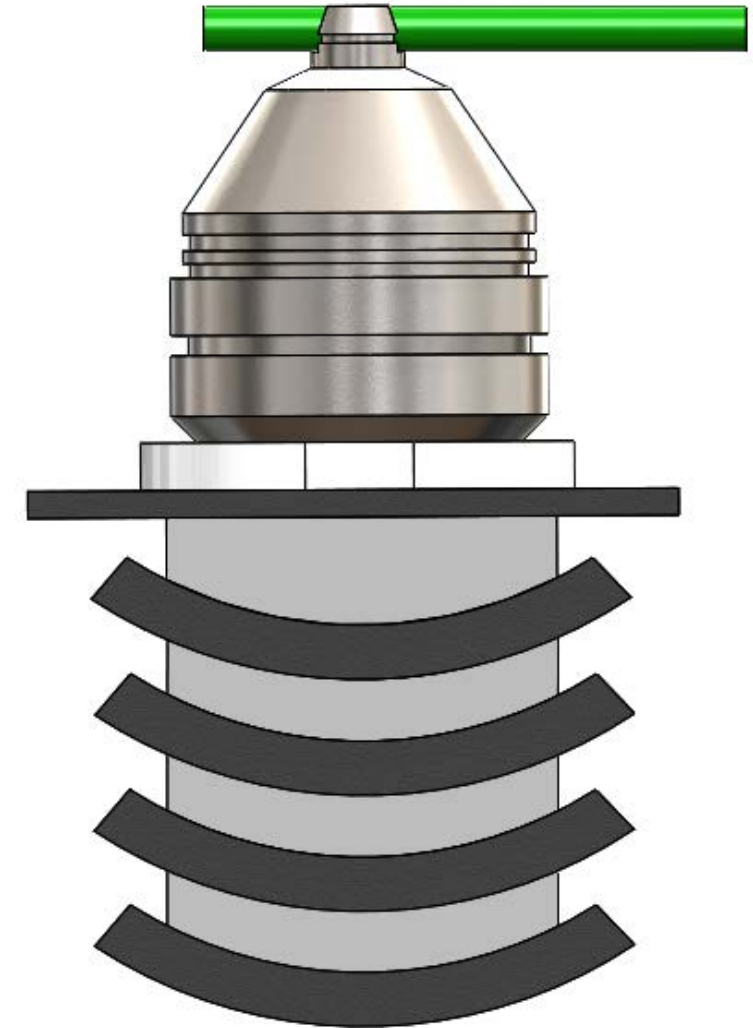
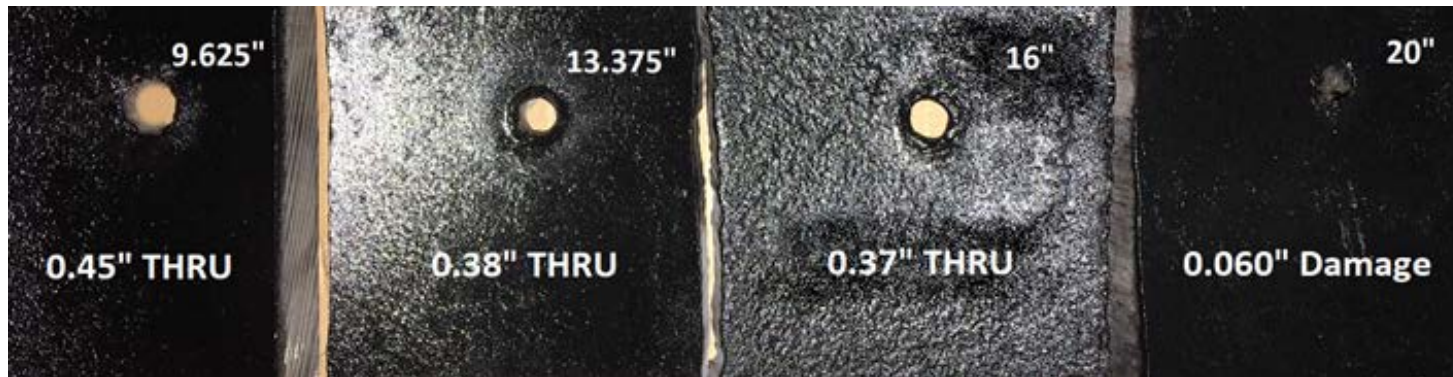


## Perforating Considerations

- Minimum running restrictions
  - 6.625” riser limited gun size to 5.125”
- Phased coverage
  - Required to reduce risk of cement channeling
- Target annular medium
  - Possibly fluid or cement
- Tubular orientation
  - Tubular orientation downhole was unknown
- Timeline
  - ~5 months from request to load-out
  - “D” annulus charge design, certification, and delivery
- Verification of product functionality
  - Use of proper tubular weight and grade

## Charge Development

- Customer requirements
  - Hole size through 16" casing >0.20"
  - Phased coverage at multiple tubular orientation
  - <40% damage to outer casing string
- Single charge testing used for charge development
  - Provides economical means of development
  - Provides confidence in charge prior to system testing



## Certification Prior to Deployment (Actual weight/grades of well casing)

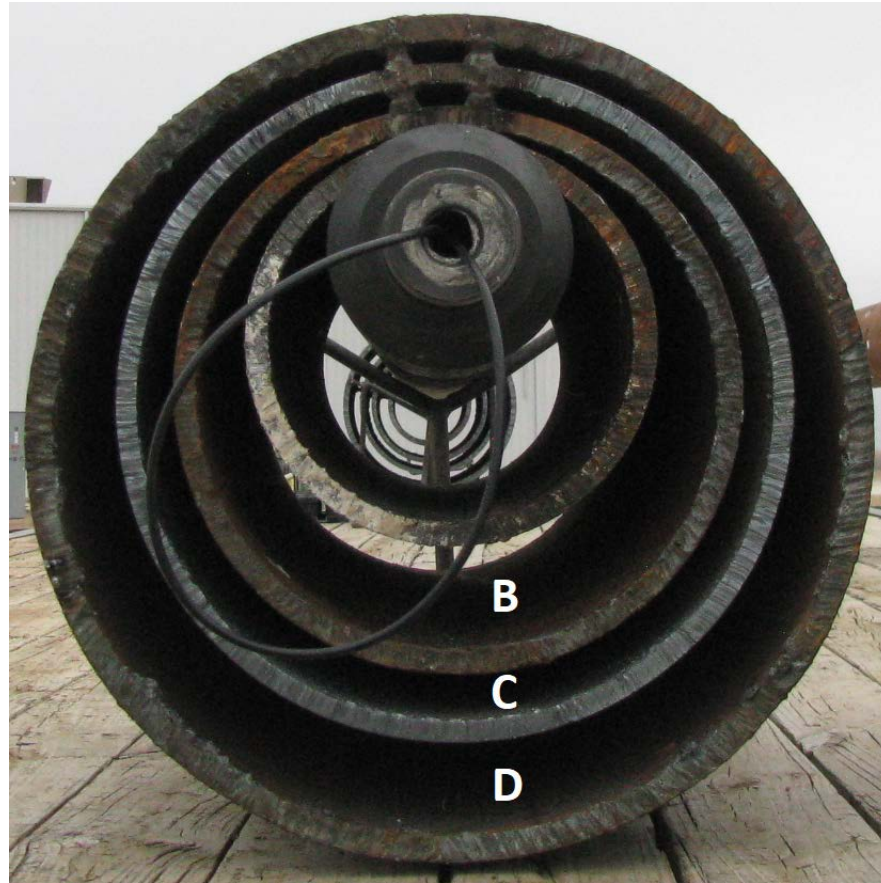


Figure 1

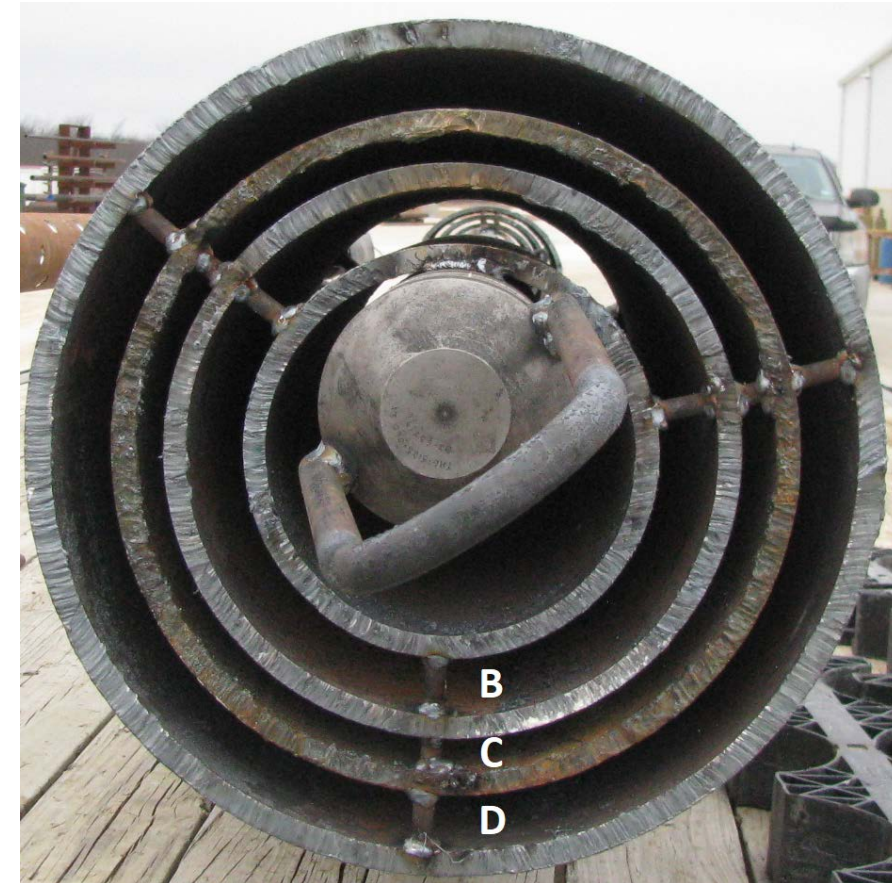


Figure 2

## Delivered System

- 5.125" HSD system
  - 360° phased system
- 0.31" average 16" casing exit hole
  - Unimpeded cement flow
- Multi-phase perforation coverage
- Negligible damage to 20" casing
  - >90% remaining casing wall
  - Contains cement within the desired annular space
  - Maintains long term integrity of outer barrier

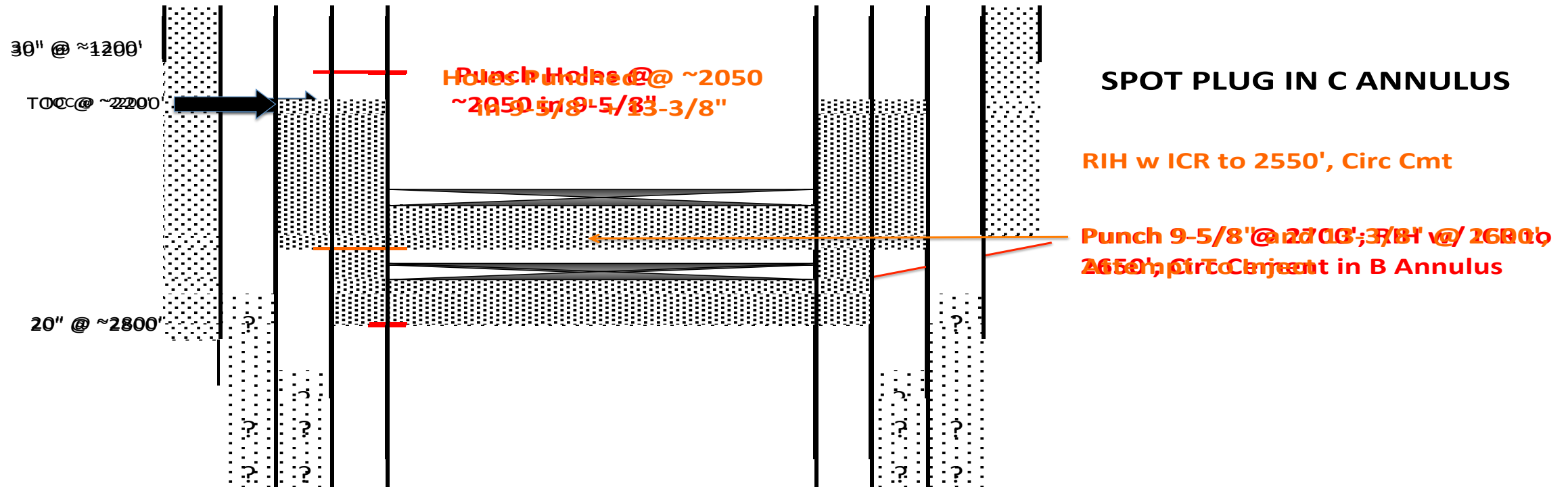


## Upper P&A Plan to Plug “D” Annulus

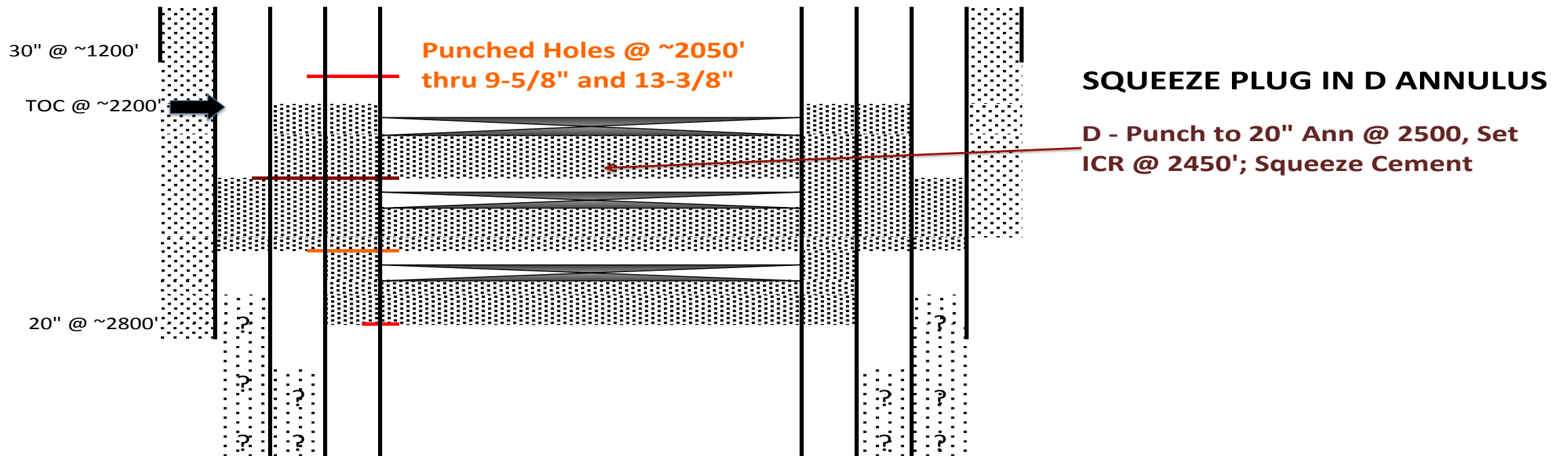
- Log identifies best location to circulate in the “B” Annulus and set cement plug using inflatable packer
- Plug in “C” Annulus similar to above
- Plugs not only provide barrier but also allow placement of cement plug in “D” annulus
- Punch holes into “D” Annulus and either squeeze or circulate cement plug in place



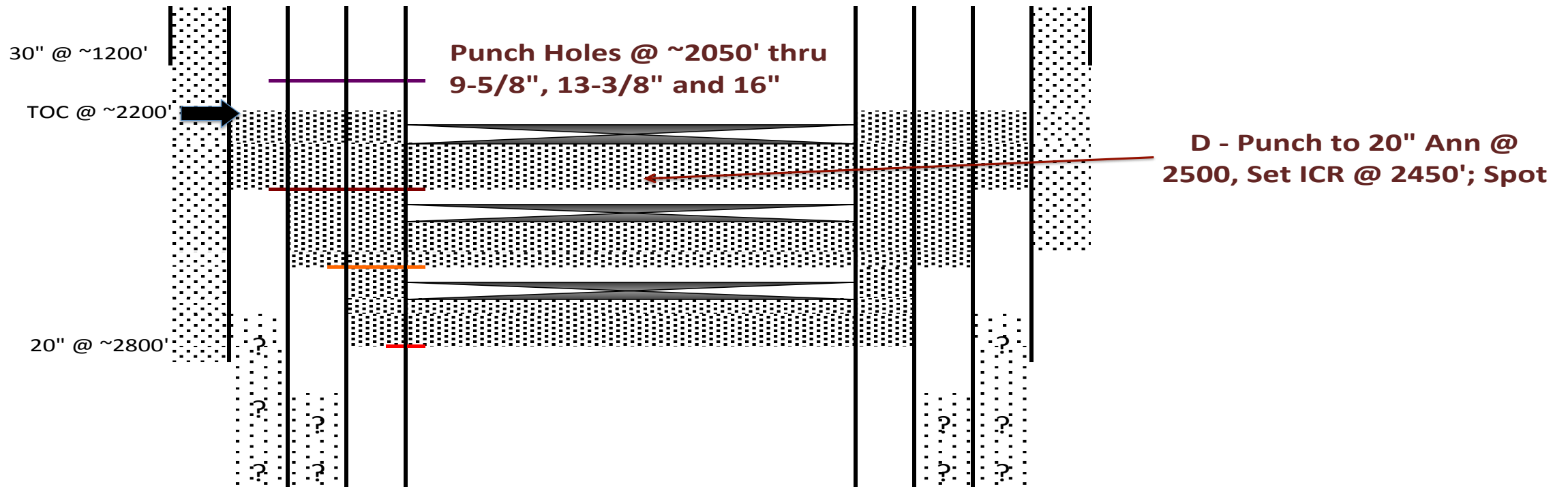
## Schematic Representation of Annular "Support" Plugs



## Schematic Representation of "D" Annulus Plug – Squeeze Option

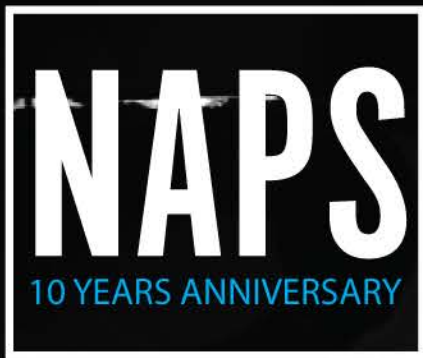


## Schematic Representation of "D" Annulus Plug – Circulate Option



## Highlights

- Charge development and system verification completed within required timeframe
- System deployed to provide a cross-sectional plug in the required location
- Use of perforating to complete the task provided a reduction in cost
  - The P&A project was completed under budget
- Advancing P&A perforating technology by providing a custom engineered solution for “D” annulus cement placement



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## QUESTIONS? THANK YOU

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